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(54) **Shampoo composition**

(57) A shampoo composition comprises:-

(a) from 1 to 60% by weight of an anion surfactant, an amphoteric surfactant or a mixture of an anionic surfactant and an amphoteric surfactant;

(b) from 0.2 to 5% by weight of an alkyl saccharide surfactant; and

(c) from 0.05 to 3% by weight of a silicone derivative,

wherein the weight ratio of component (a) to component (b) is from 2/1 to 150/1. The shampoo composition has an excellent foaming property, gives a good feel at the time of hair washing and rinsing, and has a very excellent style retention property after washing and drying the hair.

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## SHAMPOO COMPOSITION

### FIELD OF THE INVENTION

This invention relates to a shampoo composition. More specifically, it relates to a shampoo composition having an excellent foaming property at the time of hair washing, giving foam of excellent feel and an excellent feel at the time of rinsing, and imparting a good hair style retention property after washing and drying the hair.

### BACKGROUND OF THE INVENTION

Heretofore, nonionic surfactants have been used in detergent compositions for the skin and the hair and tableware because of their low irritating property, but the nonionic surfactants have the defect of inferior foaming property. As nonionic surfactants having excellent foaming property, alkyl saccharide surfactants were developed, and a detergent composition comprising this type of surfactant and an anionic surfactant such as an alkyl sulfate was proposed as disclosed in JP-A-58-104625 (the term "JP-A" as used herein means an "unexamined published Japanese Patent Application"). This composition has excellent foaming property, but when it is used for washing hair, a squeak feel arises at the time of hair washing, and it is not suitable as a shampoo.

On the other hand, JP-A-2-231412 discloses a detergent composition comprising an alkyl saccharide surfactant and a sulfosuccinic acid surfactant in combi-

nation, which have an excellent foaming property and gives creamy foam, an excellent smoothness to the skin at the time of foaming, and a good feel to the hair or the skin after washing with less irritating.

However, generally, even when an anionic surfactant is used in combination with an alkyl saccharide surfactant, a squeak feel at the time of hair washing caused by the alkyl saccharide surfactant is difficult to reduce, so that when the amount of the alkyl saccharide surfactant is increased to an extent that gives sufficient foaming property, an increase in the squeak feel cannot be avoided.

Hence, while making good use of excellent properties of the alkyl saccharide surfactant having high foaming property, a shampoo composition having good feel without a squeak feel at the time of washing the hair has been desired to be developed.

#### SUMMARY OF THE INVENTION

In the circumstances, the present inventors have conducted extensive investigations, and found that by combining an anionic surfactant and/or amphoteric surfactant, an alkyl saccharide surfactant and a silicone derivatives in a specific weight ratio, a shampoo composition having an excellent foaming property with high foam quality and excellent hair style retention property after washing and drying the hair can be obtained. This completed the present invention.

The present invention provides a shampoo composition comprising the following components (a), (b) and (c):

(a) from 1 to 60% by weight of an anionic surfactant, an amphoteric surfactant or a mixture of an anionic surfactant and an amphoteric surfactant;

(b) from 0.2 to 5% by weight of an alkyl saccharide surfactant; and

(c) from 0.05 to 3% by weight of a silicone derivative,

wherein a weight ratio of component (a) to component (b) is from 2/1 to 150/1.

#### DETAILED DESCRIPTION OF THE INVENTION

The anionic surfactant and the amphoteric surfactant to be used as component (a) in the present invention may not be particularly restricted so long as those generally used in conventional shampoo compositions.

Examples of the anionic surfactant include alkylsulfate ester salts, polyoxyethylene alkylsulfate ester salts, alkylbenzenesulfonic acid salts,  $\alpha$ -olefin sulfonic acid salts,  $\alpha$ -sulfofatty acid ester salts, alkyl phosphate ester salts and sulfosuccinic acid ester salts. Of these, the alkylsulfate ester salts, polyoxyethylene alkylsulfate ester salts, and sulfosuccinic acid ester salts are preferred. Especially, from the view-point of low irritating property, the sulfosuccinic acid ester salts are preferred.

Specific examples of the alkylbenzenesulfonic acid salt include those having a straight-chain or branched alkyl group containing 10 to 16 carbon atoms on the average. Specific examples of the  $\alpha$ -olefine sulfonic acid salt include those containing 10 to 20 carbon atoms in one molecule thereof and the  $\alpha$ -sulfofatty acid ester salts include salts or esters of an  $\alpha$ -sulfofatty acid having an alkyl or alkenyl group containing 10 to 20 carbon atoms on the average. Specific examples of the sulfosuccinic acid ester salt include salts of a sulfosuccinic acid ester of a higher alcohol containing 8 to 22 carbon atoms or an ethoxylate thereof and salts of a sulfosuccinic acid ester derived from a higher fatty acid amide.

Examples of the amphoteric surfactant include amideamine amphoteric surfactants, imidazoline amphoteric surfactants, betaine amphoteric surfactants, alkylbetaines, aminobetaines, and sulfobetaines. Of these, the amideamide amphoteric surfactants are especially preferred.

Specific examples of these amphoteric surfactants include  $\alpha$ -position addition, secondary amide, and tertiary amide imidazoline amphoteric surfactants; carbobetaine, amidobetaine, sulfobetaine, hydroxysulfobetaine and amidosulfobetaine amphoteric surfactants each having an alkyl, alkenyl or acyl group containing 6 to 24 carbon atoms; and the like. Among the imidazoline amphoteric surfactants, amideamine acid amphoteric surfactants which had been

desalted so as to increase solubility of the polymer, as disclosed in JP-A-63-128100 for example, are preferred.

Examples of the counter ion for the anionic group of these surfactants include alkali metals such as sodium and potassium; alkaline earth metals such as calcium and magnesium; ammonium ion; alkanol amines having 1 to 3 alkanol groups containing 2 or 3 carbon atoms such as monoethanolamine, diethanolamine, triethanolamine and triisopropanolamine; and the like.

Among the anionic surfactants and amphoteric surfactants, sodium polyoxyethylene lauryl ether sulfates (2 to 3 mols on the average of ethylene oxide are added), laurylsulfate triethanolamine, cocofatty acid amide ether sulfates, lauroyl-N-methyltaurine, lauroyl-N-methyl- $\beta$ -alanine, sodium polyoxyethylene lauryl sulfosuccinates (3 to 7 E.O) and the like are preferred as the anionic surfactant, and N-lauroyl-N'-carboxymethyl-N'-(2-hydroxyethyl)ethylene-diamine triethanolamine salts, sodium N-lauroyl-N-(2-hydroxyethyl)-N,N'-bis(carboxymethyl)ethylene diamine salt and the like are preferred as the amphoteric surfactant.

In the present invention, either one or two or more of these anionic surfactants or amphoteric surfactants or a mixture thereof may be used. They are used in a total amount of from 1 to 60% by weight, preferably from 2 to 30% by weight, based on the total weight of the composition. If the amount is less than 1% by weight, an amount of form tends to

be insufficient. If it exceeds 60% by weight, the viscosity of the shampoo tends to be too high and problems on practical use will be caused.

Examples of the alkyl saccharide surfactant to be used as component (b) in the present invention include those shown by formula (1):



wherein  $R^1$  is a straight-chain or branched alkyl, alkenyl or alkylphenyl group;  $R^2$  is an alkylene group having 2 to 4 carbon atoms; G is a residue of reducing sugar having 5 to 6 carbon atoms; t is a number of 0 to 10; and p is a number of 1 to 10.

Of the alkyl saccharide surfactants of formula (1), those in which  $R^1$  is an alkyl group having 6 to 18 carbon atoms, particularly 6 to 12 carbon atoms (e.g., octyl group, decyl group and lauryl group) are preferred. The value of t shows the degree of condensation of the alkylene oxide and is a number of 0 to 10. The value of t is preferably 0 to 4, and more preferably 0. As the reducing sugar represented by G, glucose, galactose, and fructose are preferred. The average degree of polymerization of the saccharide, i.e., the value of p, is 1 to 10, preferably 1 to 4. The average degree of polymerization, i.e., the value of p, may preferably be selected with taking the hydrophobic property

depending on the group of  $R^1$  into consideration. For example, when  $R^1$  is a hydrophobic group having an average carbon number of 8 to 11, the value of  $p$  is preferably 1 to 1.4, and if  $R^1$  is a hydrophobic group having an average carbon number of 12 to 14,  $p$  is preferably selected among 1.5 to 4.0. The average degree of polymerization of the sugar may be determined by proton NMR.

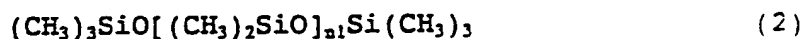
The alkyl saccharide surfactant as component (b) may be employed in the shampoo composition of the present invention in an amount of from 0.2 to 5% by weight, preferably from 0.5 to 3% by weight, based on the total weight of the composition. If the amount is less than 0.2% by weight, an excellent foaming property is not fully exhibited. If it exceeds 5% by weight, deterioration in feeling such as squeaking of the hair, will be caused. The amount within this range is also preferred from the standpoint of hair style retention property as one advantage of the present invention.

Furthermore, in the present invention, the weight ratio of the anionic surfactant or amphoteric surfactant or a mixture thereof as component (a) to the alkyl saccharide surfactant as component (b) (i.e., the (a)/(b) weight ratio) must be from 2/1 to 150/1. If the (a)/(b) ratio is less than 2/1, the squeak feel will become large. If it exceeds 150/1, the foaming will become small. The preferred (a)/(b) ratio is in the range of from 2/1 to 50/1.



Examples of the silicone derivative to be used as component (c) of the present invention include the following compounds (i) to (xi).

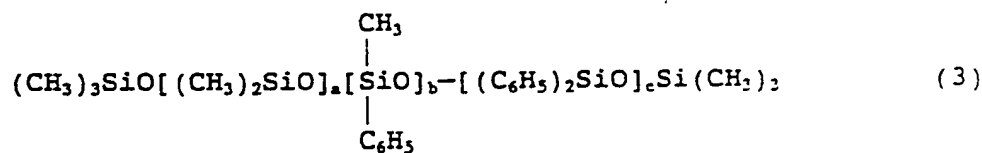
(i) Dimethylpolysiloxanes represented by formula (2):



wherein  $n1$  is an integer of 3 to 9,000.

As the methylpolysiloxane represented by formula (2), one available under the trade name KF96 from Shinetsu Chemical Co., Ltd. may be used, for example.

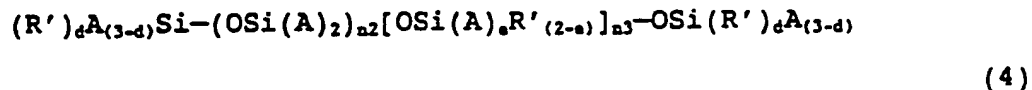
(ii) Methylphenyl polysiloxane represented by formula (3):



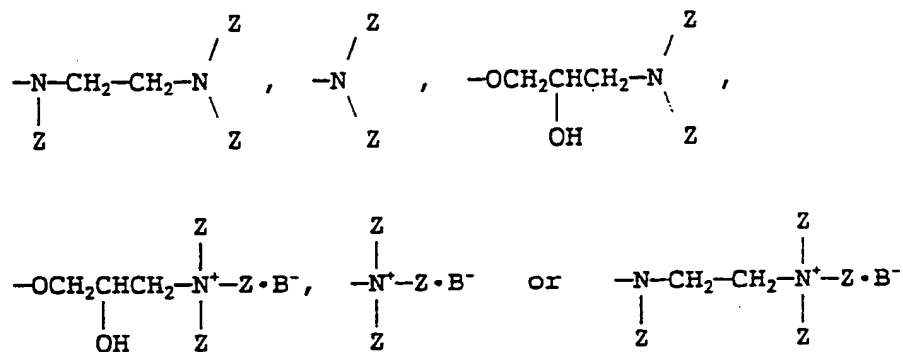
wherein  $a$  is a number of 1 to 9,000;  $b$  is a number of 0 to 9,000; and  $c$  is a number of 0 to 9,000; provided that the sum of  $a$ ,  $b$  and  $c$  is from 1 to 9,000.

The methylphenyl polysiloxanes of formula (3) are widely known, and, for example, a product available under the trade name KF50 from Shinetsu Chemical Co., Ltd. may be used.

(iii) Amino-modified silicones represented by formula (4):



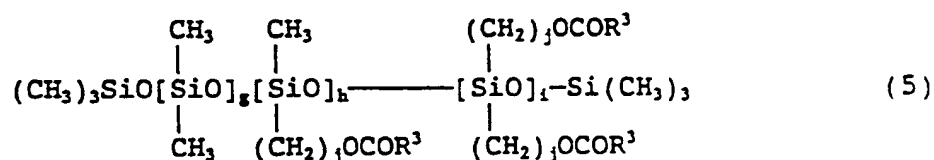
wherein A is a group selected from a hydrogen atom, a phenyl group, a hydroxyl group and alkyl groups having 1 to 8 carbon atoms; d is 0 or an integer of 1 to 3; e is 0 or 1; n2 is 0 or an integer of 1 to 1999 and n3 is an integer of 1 to 2,000, provided that the sum of n2 and n3 is an integer of 1 to 2,000; and R' represents a group of formula  $-C_f H_{2f} L$  in which f is an integer of 2 to 8 and L is a group of the following formula:



wherein Z is a selected from a hydrogen atom, a phenyl group, a benzyl group, and alkyl groups having 1 to 20 carbon atoms; and B<sup>-</sup> is a halogen atom selected from Cl<sup>-</sup>, Br<sup>-</sup>, I<sup>-</sup> and F<sup>-</sup>.

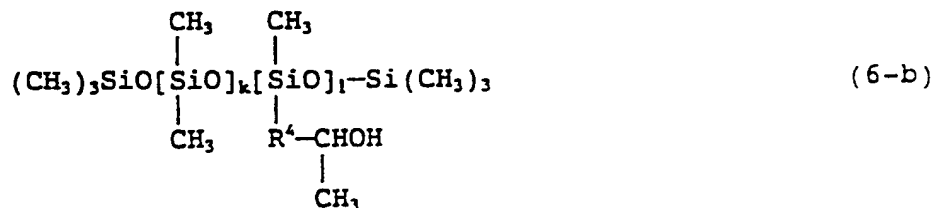
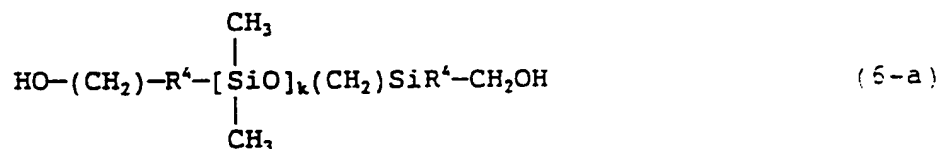
Examples of the amino-modified silicones of formula (4) include those marketed under the trade names SF8417, DC536 and the like from Toray Silicone Co., Ltd. and that marketed under the trade name Aminoalkylsilicone Emulsion SM8702 from Toray Silicone Co., Ltd.

(iv) Fatty acid-modified polysiloxanes represented by formula (5):



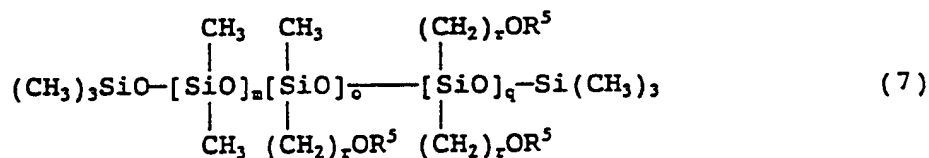
wherein each of g, h and i is a number of 1 to 350; j is a number of 0 to 10; and R<sup>3</sup> represents an alkyl group having 9 to 21 carbon atoms.

(v) Alcohol-modified silicones represented by formula (6-a) or formula (6-b):



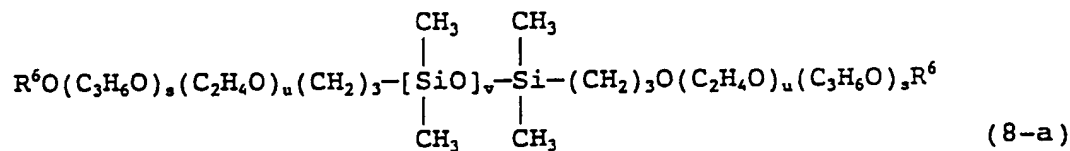
wherein each of k and l is a number of 1 to 500, preferably 1 to 200; and R<sup>4</sup> represents a group of C<sub>n4</sub>H<sub>2n4</sub> in which n<sub>4</sub> is a number of 0 to 4.

(vi) Aliphatic alcohol-modified silicones represented by formula (7):

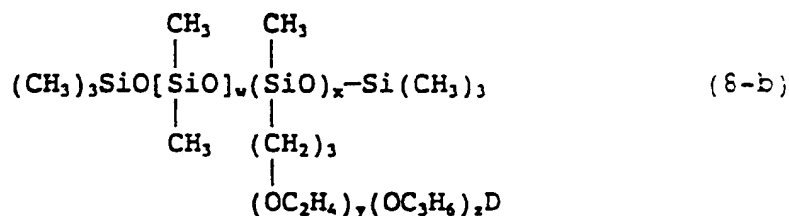


wherein m is a number of 0 to 300; o is a number of 0 to 300; q is a number of 0 to 300; r is a number of 0 to 5; and R<sup>5</sup> is a group of C<sub>n5</sub>H<sub>2n5+1</sub> in which n<sub>5</sub> is a number of 4 to 22; provided that the sum of m, n and q is 1 to 300.

(vii) Polyether-modified silicones represented by formula (8-a) or (8-b):



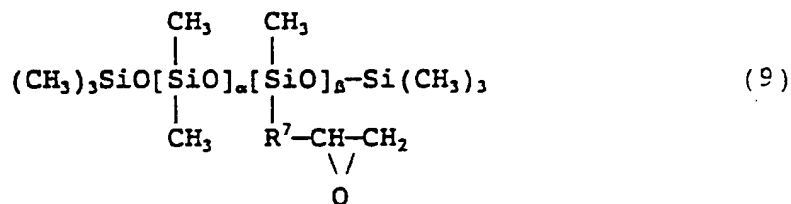
wherein s is a number of 0 to 35; u is a number of 1 to 45; v is a number of 0 to 400; and R<sup>6</sup> is a group of C<sub>n6</sub>H<sub>2n6+1</sub> in which n<sub>6</sub> is a number of 1 to 4.



wherein w is a number of 2 to 110, preferably 20 to 80; x is a number of 1 to 50, preferably 3 to 30; y is a number of 0 to 50, preferably 5 to 30; z is a number of 0 to 50, preferably 0 to 35; and D is an alkyl group having 1 to 12 carbon atoms or a group of the formula  $\text{OC}_{n7}\text{H}_{2n7+1}$  in which  $n7$  is a number of 0 to 6.

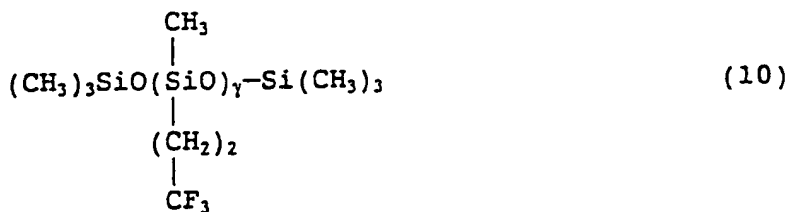
The polyether-modified silicones of formulae (8-a) and (8-b) are widely known, and, for example, those obtained under the trade names KF351 and KF352 from Shinetsu Chemical Co., Ltd. may be used.

(viii) Epoxy-modified silicones represented by the formula (9):



wherein  $\alpha$  is a number of 1 to 500, preferably 1 to 250;  $\beta$  is a number of 1 to 50, preferably 1 to 30; and  $\text{R}^7$  is an alkylene group having 1 to 3 carbon atoms.

(ix) Fluorine-modified silicones represented by formula (10):



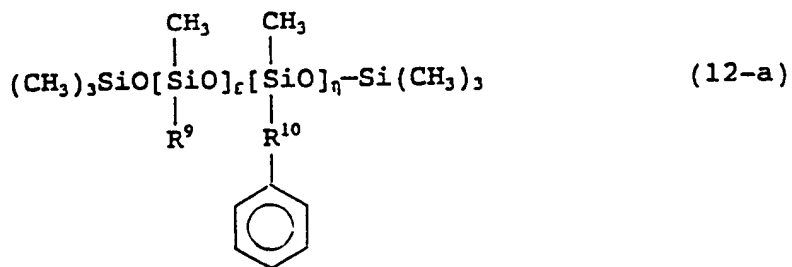
wherein  $\gamma$  is a number of 1 to 400; preferably 1 to 250.

(x) Cyclic silicones represented by formula (11):

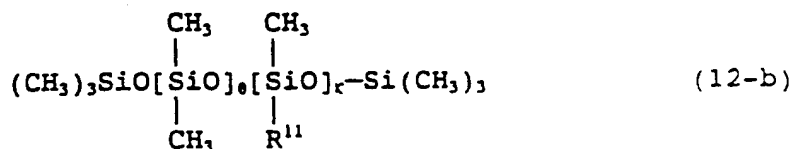


wherein  $\delta$  is a number of 3 to 8; and  $\text{R}^8$  is an alkyl group having 1 to 3 carbon atoms.

(xi) Alkyl-modified silicones represented by formula (12-a) or (12-b):



wherein each of  $\epsilon$  and  $\eta$  is a number of 1 to 500, preferably 1 to 200;  $R^9$  is an alkyl group having 2 to 18 carbon atoms; and  $R^{10}$  represents  $C_{n8}H_{2n8}$  in which  $n8$  is a number of 0 to 4.



wherein each of  $\theta$  and  $\kappa$  is a number of 1 to 500, preferably 1 to 200; and  $R^{11}$  is an alkyl group having 10 to 16 carbon atoms.

Any one or a mixture of these silicone derivatives can sufficiently develop the effect of the present invention. From the viewpoint of improving good hair style retention property after washing and drying the hair, it is preferred to use the methyl-polysiloxanes (i), the amino-modified silicones (iii), the polyether-modified silicones (vii) and the cyclic silicones (x). It is more preferred to use the amino-modified silicones (iii) and the polyether-modified silicones (vii) in combination.

The value of  $n1$  in the methyl polysiloxane (i) can be selected from 0 to 900 according to the finishing feel. To obtain a light finishing feel, it is preferably about 10 to about 1,000, and to impart sufficient tension and resilience to the hair, it is preferably at least 2,000, more preferably about 4,000 to about 7,000. As the amino-modified silicones

(iii), those in which d is 0, e is 1, f is 3, A is a hydroxyl group or a methyl group, and L is  $\text{-NHCH}_2\text{CH}_2\text{NH}_2$ , which is called amodimethicone in the CTFA dictionary of U.S.A., is especially preferred.

In the present invention, one or two or more of silicone derivative may be used as the component (c). They are used in a total amount of from 0.05 to 3% by weight, preferably from 0.1 to 2% by weight, in the shampoo composition of the present invention. If the amount is less than 0.05% by weight, the feel at the time of rinsing and the hair style retention property after washing and drying the hair will become deteriorated. If it exceeds 3% by weight, deterioration of foaming property such as the decrease in the amount of foam will be caused.

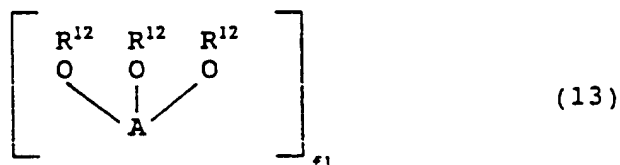
The shampoo composition of the present invention can be prepared by mixing the above essential components with water in a conventional manner. If required, the other components may be added in amounts which do not impair the effect of the invention. For example, an anionic surfactant and a cationic surfactant may be incorporated. Furthermore, foam increasing agents, ultraviolet absorbers, antiseptics, various solvents, anti-dandruff agents, antioxidants, coloring agents and perfumes may be incorporated according to the object.

If a cationic polymer is incorporated in the shampoo composition of the present invention, a better effect can be

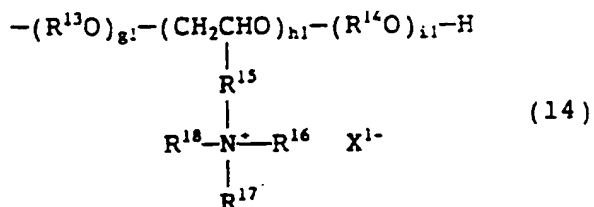


obtained. Examples of the cationic polymer include cationized cellulose derivatives, cationized starches, diallyl quaternary ammonium salt/acrylamide copolymer, quaternized polyvinyl pyrrolidone derivatives, polyglycols, polyamine condensates, and poly(dimethylmethylenepiperidinium chloride). They may preferably be incorporated in an amount of from 0.05 to 2% by weight, preferably from 0.1 to 1% by weight, in the shampoo composition of the present invention.

As cationized cellulose derivatives, those represented by general formula (13) are preferable:



wherein A represents a residue of an anhydrous glucose unit; f1 is an integer of from 50 to 20,000; and each R<sup>12</sup> represents a group represented by the following general formula (14):



wherein R<sup>13</sup> and R<sup>14</sup> each represent an alkylene group containing 2 or 3 carbon atoms;

g1 is an integer of from 0 to 10;

h1 is an integer of from 0 to 3;

il is an integer of from 0 to 10;

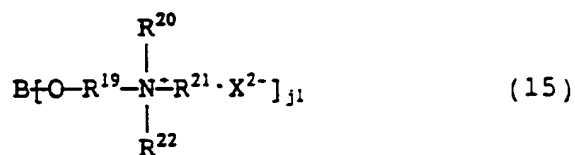
R<sup>15</sup> represents an alkylene or hydroxyalkylene group each containing from 1 to 3 carbon atoms;

R<sup>16</sup>, R<sup>17</sup> and R<sup>18</sup> may be the same or different and each represents an alkyl, aryl or aralkyl group containing from not more than 10 carbon atoms, or R<sup>16</sup>, R<sup>17</sup> and R<sup>18</sup> may form a heterocyclic group together with the adjacent nitrogen atom; and

X<sup>1</sup> represents an anion (for example, an ion of chlorine, bromine, iodine, sulfuric acid, sulfonic acid, methylsulfuric acid, phosphoric acid or nitric acid).

The degree of substitution of the cation in the cationized cellulose is from 0.01 to 1. Namely, the average of h1 per anhydrous glucose unit is from 0.01 to 1, preferably from 0.02 to 0.5. The average of g1 + il is from 1 to 3. A degree of substitution of the cation smaller than 0.01 is insufficient. Although the degree of substitution of the cation may exceed 1, it is preferably not larger than 1, in view of the reaction yield. The molecular weight of the cationized cellulose derivative used herein ranges from approximately 100,000 to 3,000,000.

As the cationic starch, those represented by the following general formula (15) are preferable:



wherein B represents a starch residue;

R<sup>19</sup> represents an alkylene or a hydroxyalkylene group;

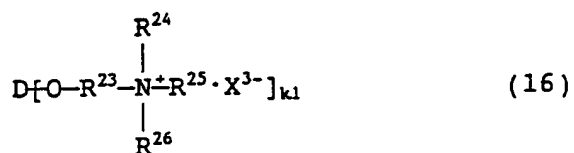
R<sup>20</sup>, R<sup>21</sup> and R<sup>22</sup> may be either the same or different and each represents an alkyl, aryl or aralkyl group containing not more than 10 carbon atoms; or R<sup>20</sup>, R<sup>21</sup> and R<sup>22</sup> may form a heterocyclic group together with the adjacent nitrogen atom;

X<sup>2</sup> represents an anion (for example, an ion of chlorine, bromine, iodine, sulfuric acid, sulfonic acid, methylsulfuric acid, phosphoric acid or nitric acid); and

j1 is a positive integer.

The degree of substitution of the cation in the cationic starch is from 0.01 to 1. Namely, those wherein 0.01 to 1, in particular 0.02 to 0.5, cation group is introduced per anhydrous glucose unit are preferable. A degree of substitution of the cation smaller than 0.01 is insufficient. Although the degree of substitution of the cation may exceed 1, it is preferably not larger than 1 by in view of the reaction yield.

As the cationized guar gum derivative, those represented by the following general formula (16) are preferable:



wherein D represents a guar gum residue;

R<sup>23</sup> represents an alkylene or a hydroxyalkylene group;

R<sup>24</sup>, R<sup>25</sup> and R<sup>26</sup> may be either the same or different and each represents an alkyl, aryl or aralkyl group containing not more than 10 carbon atoms or R<sup>24</sup>, R<sup>25</sup> and R<sup>26</sup> may form a heterocyclic group together with the adjacent nitrogen atom;

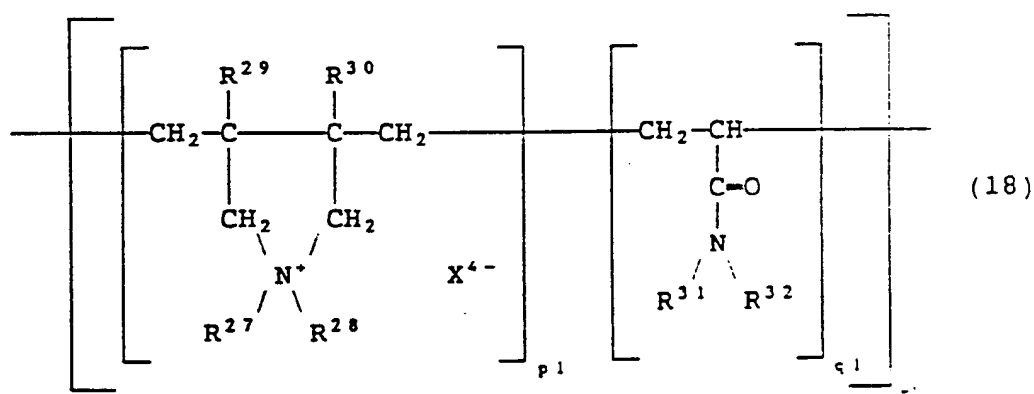
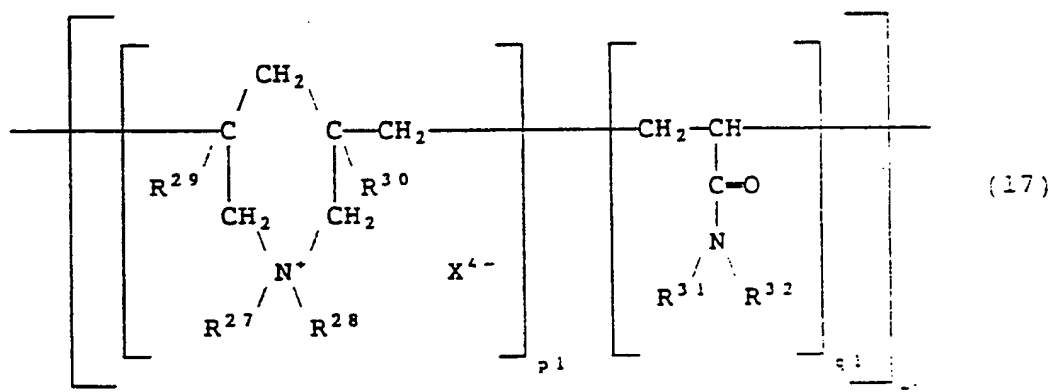
X<sup>3</sup> represents an anion (for example, an ion of chlorine, bromine, iodine, sulfuric acid, sulfonic acid, methylsulfuric acid, phosphoric acid or nitric acid); and

k1 is a positive integer.

The degree of substitution of the cation in the cationized guar gum derivative is from 0.01 to 1. Namely, those wherein 0.01 to 1, in particular 0.02 to 0.5, cation group is introduced per sugar unit are preferable. Cationic polymers of this type are described, for example, in JP-B-58-35640, JP-B-60-46158 and JP-A-58-53996 (the term "JP-B" as

used herein means an "examined Japanese patent publication") and marketed, for example, from Cellanese Stein-Hohl Co. under the trade name, JAGUAR.

As the diallyl quaternary ammonium salt polymer or diallyl quaternary ammonium salt/acrylamide copolymer, those represented by the following general formula (17) or (18) are preferable:



wherein  $\text{R}^{27}$  and  $\text{R}^{28}$  may be the same or different and each represents a hydrogen atom, an alkyl group

having 1 to 18 carbon atoms, a phenyl group, an aryl group, a hydroxyalkyl group, an amidoalkyl group, a cyanoalkyl group, an alkoxyalkyl group or a carboalkoxyalkyl group;

$R^{29}$ ,  $R^{30}$ ,  $R^{31}$  and  $R^{32}$  may be either the same or different and each represents a hydrogen atom, a lower alkyl group containing from 1 to 3 carbon atoms or a phenyl group;

$X^4$  represents an anion (for example, an ion of chlorine, bromine, iodine, sulfuric acid, sulfonic acid, methylsulfuric acid or nitric acid);

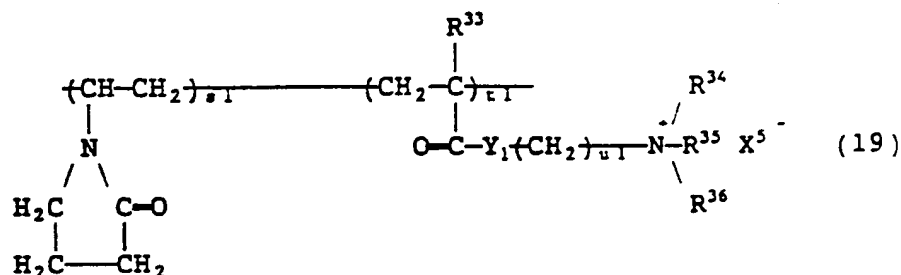
$p_1$  is an integer of from 1 to 50;

$q_1$  is an integer of from 0 to 50; and

$r_1$  is an integer of from 150 to 8,000.

The molecular weight of the diallyl quaternary ammonium salt/acrylamide copolymer may range from approximately 30,000 to 2,000,000, preferably from 100,000 to 1,000,000.

As the quaternarized polyvinylpyrrolidone derivative, those represented by the following general formula (19) are preferable:



wherein  $\text{R}^{33}$  represents a hydrogen atom or an alkyl group having 1 to 3 carbon atoms;

$\text{R}^{34}$ ,  $\text{R}^{35}$  and  $\text{R}^{36}$  may be either the same or different and each represents a hydrogen atom, an alkyl group, a hydroxyalkyl group, an amidoalkyl group, a cyanoalkyl group, an alkoxyalkyl group or a carboalkoxyalkyl group, each containing from 1 to 4 carbon atoms;

$\text{Y}_1$  represents an oxygen atom or an NH group in an amide bond;

$\text{X}^5$  represents an anion (for example, an ion of chlorine, bromine, iodine, sulfuric acid, sulfonic acid, an alkylsulfuric acid containing from 1 to 4 carbon atoms, phosphoric acid or nitric acid);

$u1$  is an integer of from 1 to 10; and

$s1 + t1$  is an integer of from 20 to 8,000.

The molecular weight of the quaternarized polyvinylpyrrolidone derivative may range from approximately 10,000 to 2,000,000, preferably from 50,000 to 1,500,000.

The shampoo composition of the present invention has an excellent foaming property, gives a good feel at time of washing and rinsing the hair, and has very superior hair style retention property after washing and drying the hair.

The following Examples are given to further illustrate the invention, but the invention should not be limited to these examples.

In the following Examples, each of the compositions were evaluated by the following methods.

(Evaluation Method 1)

One gram of the shampoo composition was applied to a Japanese hair bundle having a length of 20 cm and a weight of 25 g, foamed and rinsed. The foaming property, feels of the foam and the hair, and a hair style retention property were evaluated by five skilled panelists.

(Evaluation Method 2)

Five grams of the shampoo composition was applied to the hairs of 10 Japanese women. A skilled hairdresser foamed and rinsed the shampoo composition, and evaluated foaming property, a feel of the foam and a hair style retention property.

Evaluation Standards (common to both Evaluation Methods 1 and 2)

Foaming Property:

- A: Well foaming during shampooing
- B: Slightly poor foaming during shampooing



C: Poor foaming during shampooing

Feel:

A: Good smoothness and finger passing during shampooing and rinsing

B: Slightly poor smoothness and finger passing during shampooing and rinsing

C: Poor smoothness and finger passing during shampooing and rinsing

Hair Style Retention Property:

A: Less hopping hairs after drying

B: Slightly many hopping hairs after drying

C: Many hopping hairs after drying

EXAMPLE 1

The shampoo compositions shown in Table 1 were prepared, and the foaming property, a feel of foam and the hair and the hair style retention property were examined in accordance with the above evaluation method 1. The results are shown in Table 1.

In Table 1, the abbreviations used are the following meanings.

SS: Lauryl disodium polyoxyethylenesulfosuccinate (4 E.O.)

AS: Laurylsulfuric acid triethanolamine

ES: Sodium polyoxyethylenelauryl ether sulfate (2 E.O.)

AA: 2-Alkyl-N-carboxymethyl-N-hydroxyethylimidazolinium betaine

AG: Alkyl polyglycoside (the alkyl group is a mixture of a dodecyl group and a tridecyl group having an average number of carbon atoms of 12.5 with the glucoside having an average sugar polymerization degree of 1.4)

The numerals in Table 1 are % by weight of each component based on the total weight of the composition.

TABLE 1

	Comparative Products				Products of the Invention						
	1	2	3	4	1	2	3	4	5	6	7
SS	10	-	-	-	10	-	-	-	10	-	-
AS	-	20	-	-	-	20	-	-	-	-	-
ES	-	-	10	-	-	-	10	-	-	10	-
AA	-	-	-	10	-	-	-	10	-	-	10
AG	1	2	2	1	1	2	2	1	1	2	1
Silicone Derivative:											
Amino-modified silicone <sup>1)</sup>	-	-	-	-	1	-	-	1	1	0.5	0.5
Polyether-modified silicone <sup>2)</sup>	-	-	-	-	-	2	2	-	1	2	1
Purified water	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance
Foaming property	B	A	A	A	A	A	A	A	A	A	A
Feel (at the time of washing and rinsing)	B	B	B	B	A	A	A	A	A	A	A
Style retention property	B	B	B	B	A	A	A	A	A	A	A

1) Amino-modified silicone: Amodimethicone emulsion (amino-modified emulsion SM8702C, Toray-Dow Corning Silicone Co., Ltd.)

2) Polyether-modified silicone: Dimethylsiloxane/methyl(polyoxyethylene)siloxane copolymer (Silicone KF-6005, Shinetsu Chemical Co., Ltd.)

## EXAMPLE 2

The shampoo compositions shown in Table 2 were prepared, and the foaming property, a feel of the foam and the hair and a hair style retention property were examined in accordance with the evaluation method 2. The results are shown in Table 2.

The abbreviations used in Table 2 are the same meanings as in Example 1, and the numerals in Table 2 are % by weight of each component based on the total weight of the composition.

TABLE 2

Compar- ative Product 5	Products of the Invention																	
	8	9	10	11	12	13	14	15	16	17	18							
AA	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
SS	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
AG	7.0	1.0	2.0	3.0	1.0	1.0	1.0	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0	2.0	
Silicone Derivative:																		
Amino- modified silicone <sup>1)</sup>	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
Polyether- modified silicone <sup>2)</sup>	-	-	-	-	-	-	-	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Cationic Polymer:																		
Cationized cellulose <sup>3)</sup>	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Merquat <sup>4)</sup>	-	-	-	0.05	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Lauric acid diethanol amide	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	

TABLE 2 (cont'd)

Compar- ative Product	Products of the Invention											
	8	9	10	11	12	13	14	15	16	17	18	
5												
Color and perfume	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	
Purified water	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	
Foaming property	A	A	A	A	A	A	A	A	A	A	A	
Feel (squeak feel)	C	A	A	A	A	A	A	A	A	A	A	
Style reten- tion property	B.	A	A	A	A	A	A	A	A	A	A	

3) Cationized cellulose: hydroxyethyl cellulose hydroxypropyltrimethylammonium chloride ether (Polymer JR-400, manufactured by UCC Co.)

4) Merquat: Poly(dimethylmethylenepiperidinium chloride) (Merquat 100, manufactured by Merck & Co.)

While the invention has been described in detail and with reference to specific examples thereof, it will be apparent to one skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope thereof.

**CLAIMS:**

1. A shampoo composition comprising the following components (a), (b) and (c):

(a) from 1 to 60% by weight of an anionic surfactant, an amphoteric surfactant, or a mixture of an anionic surfactant and an amphoteric surfactant;

(b) from 0.2 to 5% by weight of an alkyl saccharide surfactant; and

(c) from 0.05 to 3% by weight of a silicone derivative;

wherein a weight ratio of component (a) to component (b) is 2/1 to 150/1.

2. A shampoo composition of claim 1, wherein said component (a) amounts from 2 to 30 % by weight, said component (b) amounts from 0.5 to 3 % by weight, and said component (c) amounts from 0.1 to 2 % by weight.

3. A shampoo composition of claim 1, wherein said weight ratio of component (a) to component (b) is 2/1 to 50/1.

4. A shampoo composition of claim 1, wherein said anionic surfactant is selected from alkylsulfate ester salts, polyoxyethylene alkylsulfate ester salts, alkylbenzene-sulfonic acid salts,  $\alpha$ -olefin sulfonic acid salts,  $\alpha$ -sulfo-fatty acid ester salts, alkyl phosphate ester salts and sulfosuccinic acid ester salts, and said amphoteric surfactant is selected from amideamine amphoteric



surfactants, imidazoline amphoteric surfactants, betaine amphoteric surfactants, alkylbetaines, aminobetaines and sulfobetaines.

5. A shampoo composition of claim 1, wherein said alkyl saccharide surfactant is represented by formula (1):



wherein  $R^1$  is a straight chain or branched chain alkyl, alkenyl or alkylphenyl group;  $R^2$  is an alkylene group having 2 to 4 carbon atoms; G is a residue of reducing sugar having 5 to 6 carbon atoms; t is a number of 0 to 10; and p is a number of 1 to 10.

6. A shampoo composition of claim 1, wherein said silicone derivative is selected from dimethylpolysiloxanes, methylphenyl polysiloxane, amino-modified silicones, fatty acid-modified polysiloxanes, alcohol-modified silicones, aliphatic alcohol-modified silicones, polyether-modified silicones, epoxy-modified silicones, fluorine-modified silicones, cyclic silicones and alkyl-modified silicones.

7. A shampoo composition of claim 1, wherein said composition further comprises from 0.05 to 2 % by weight of a cationic polymer.

8. A shampoo composition of claim 7, wherein said cationic polymer is selected from cationized cellulose derivatives, cationized starches, diallyl quaternary ammonium

salt/acrylamide copolymer, quaternized polyvinyl pyrrolidone derivatives, polyglycols, polyamine condensates, and poly(dimethylmethylenepiperidinium chloride).

9. A method for improving a feel to the hair or the skin of a shampoo composition comprising an alkyl saccharide surfactant and an anionic surfactant, an amphoteric surfactant or a mixture of an anionic surfactant and an amphoteric surfactant, which comprises the step of mixing a silicone derivative into said shampoo composition, wherein said anionic surfactant, amphoteric surfactant or said mixture of an anionic surfactant and an amphoteric surfactant amounts from 1 to 60% by weight in said shampoo composition, said alkyl saccharide surfactant amounts from 0.2 to 5% by weight in said shampoo composition, said silicone derivative amounts from 0.05 to 3% by weight in said shampoo composition, and a weight ratio of said anionic surfactant, amphoteric surfactant or said mixture of an anionic surfactant and an amphoteric surfactant to said alkyl saccharide surfactant is from 2/1 to 150/1.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

9208945.7

**Relevant Technical fields**

(i) UK Cl (Edition K ) C5D (DHF, DJB)

(ii) Int Cl (Edition 5 ) A61K

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

**Search Examiner**

MR J FULCHER

**Date of Search**

13 JULY 1992

Documents considered relevant following a search in respect of claims

1 TO 9

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	EP 0190010 A2 (PROCTOR & GAMBLE)	1

Category	Identity of document and relevant passages	Relevant to claim(s)

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